

## Performance of blackgram (*Vigna mungo*) as influenced by duration of rice (*Oryza sativa*) varieties in rice-based *utera* cropping system under rainfed shallow lowland

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### ABSTRACT

*On-farm farmers' participatory trials were carried out in five different villages of Tangi Block in the Khurda district of Orissa during the crop growing season of 2001-02 and 2002-03 to study the effect of duration of different rice varieties on the performance of succeeding blackgram crop in rice-blackgram utera cropping system under rainfed shallow lowland. The highest grain yield of 5.7 t ha<sup>-1</sup> was recorded with the improved high yielding variety of rice cv. Moti (155 days). While, the highest seed yield of blackgram (0.68 t ha<sup>-1</sup>) was achieved in the treatment plots where the improved rice variety Swarna (135 days) was raised during the wet season. The highest net return (Rs. 23163 ha<sup>-1</sup>) as well as benefit : cost ratio of 3.07 was recorded in the treatment where rice variety, Moti was adopted in rice – blackgram utera cropping system.*

**Key words:** Growth duration, rice, blackgram, utera cropping, economics

Options of raising a short duration second crop of pulses after harvest of rice is feasible in areas under rainfed shallow lowland situations where residual moisture deplete fast soon after harvest of rice. But the success of *utera* crop depends largely on the appropriate time of sowing. As the *utera* crop is generally sown two weeks after flowering of rice crop (at dough stage), the moisture status of the paddy field during that stage largely influence the germination and early establishment of *utera* crop. The duration of rice varieties greatly influence the performance of *utera* crop as the sowing time of *utera* crop depends on the dough stage of rice crop. Thus, it is important that the rice cultivation should be so designed as to improve the productivity of paddy and simultaneously bring about improvement in *utera* cultivation. On-farm trials were conducted to identify best suitable duration of the rice crop to enable increase its yield.

On-farm farmers' participatory trials were carried out in five different villages in the Tangi block of Khurda district of Orissa during the crop growing season of 2001- 02 and 2002- 03 under the National Agricultural Technology Project entitled 'Development of agro- techniques for sustainable productivity in

*rice-based utera cropping system*'. The soil of experimental site was clay loam with alkaline in reaction, having pH in the range of 8.0 - 8.7, organic carbon 0.60 – 0.78%, total N 0.067 – 0.081%, available P 18.0 – 24.6 kg ha<sup>-1</sup> and available K in the range of 112.3 – 129.0 kg ha<sup>-1</sup>. The experiment was laid out in randomized complete block design in ten farmer's field (two farmers from each village in five different villages). The treatments comprised of four rice varieties of varying duration, T<sub>1</sub>- traditional rice variety grown by the farmers (cv. Dhusara of 155 days duration); T<sub>2</sub>- recommended high yielding variety (HYV) of rice of same duration as that of farmers adopted, Moti of 155 days duration; T<sub>3</sub>- recommended HYV of rice of 10 days shorter than Moti, Pooja 145 days duration and T<sub>4</sub>- recommended HYV of rice of 20 days shorter than Moti, Swarna of 135 days duration. Rice crop was established by direct seeding in first week of June. A uniform fertilizer dose of 60:30:30 kg N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O ha<sup>-1</sup> was applied to rice crop. Blackgram (cv. T-9 local) was sown in standing crop of rice by broadcasting the seeds with a seed rate of 30 kg ha<sup>-1</sup> at two weeks after flowering of rice depending upon the duration of different rice varieties. An area of 200 m<sup>2</sup> was considered as one treatment plot and each farmers field

with an area of around 800 m<sup>2</sup> was considered as one replication. Thus, there were 10 replications. Yield and yield attributes of both the crops of rice and blackgram were recorded at harvest and the economics of different treatments were calculated based on the price of the produce in local market and wages prevalent in the area. Productivity of rice as well as *utera* crop was recorded and finally economics was computed for the entire rice-based *utera* cropping system.

The experimental results revealed that all the improved high yielding varieties of rice, (Moti, Pooja and Swarna), irrespective of their duration performed well than the traditional rice variety, Dhusara. Among the improved rice varieties, the long duration variety, Moti, recorded significantly highest grain yield of 5.7 t ha<sup>-1</sup> and it was 106% more than the traditional rice variety, Dhusara. The increased yield was attributed to increase number of panicles m<sup>-2</sup>, grains panicle<sup>-1</sup> and 1000-grain weight (Table 1). Similar finding was also reported by Jana *et al.*, 2003.

Though Moti, a late maturing improved rice variety gave higher grain yield of rice, but the performance of blackgram was better as an *utera* crop with relatively early maturing rice varieties like Pooja

**Table 1. Yield attributes and grain yield of rice as affected by growth duration (pooled data)**

Treatments	Panicles m <sup>-2</sup>	Grains panicle <sup>-1</sup>	1000 grain weight (g)	Grain yield (t ha <sup>-1</sup> )
Rice cv Dhusara	200	122	25.7	2.7
Rice cv. Moti	353	178	26.2	5.6
Rice cv. Pooja	284	170	25.4	4.0
Rice cv. Swarna	243	153	26.1	3.4
CD (=0.05)	27.20	20.07	1.18	0.3

**Table 2. Effect of growth duration of rice on yield and yield attributes of blackgram in rice-blackgram *utera* cropping system(pooled data)**

Treatments	Plant population m <sup>-2</sup>	No. of pods plant <sup>-1</sup>	No. of seeds pod <sup>-1</sup>	1000 seed weight (g)	Seed yield (t ha <sup>-1</sup> )
Rice (cv Dhusara) - blackgram	61	27	4	36.3	0.35
Rice (cv. Moti) ) - blackgram	71	35	5	36.9	0.45
Rice (cv. Pooja) - blackgram	83	52	6	37.7	0.53
Rice (cv. Swarna) - blackgram	94	65	6	38.4	0.68
CD (P=0.05)	7.62	5.51	1.14	2.36	0.12

and Swarna. Seed yield of blackgram as *utera* crop reduced remarkably when it was grown in sequence with long duration traditional rice variety, Dhusara. Significantly highest seed yield of blackgram (6.8 t ha<sup>-1</sup>) was recorded in treatment T<sub>4</sub> where early maturing high yielding rice variety, Swarna was grown as preceding crop. The trend in the increase in seed yield of blackgram was found to be directly related to earliness in maturity of the rice varieties. The yield reduction under different treatments was mainly due to reduced growth of blackgram as reflected from different yield attributing characters (Table 2). This trend in reduction of crop performance resulted from delayed sowing of blackgram as sowing of blackgram crop was based on the flowering time of rice varieties. Water recedes quickly from rainfed shallow lowland during post-monsoon season and the reduction in soil moisture availability at sowing time of blackgram in the treatment plots where long duration rice varieties were grown, ultimately hampered the performance of *utera* crop. The results were in conformity with the findings of Kurchania *et al.*, 2002.

While evaluating the economic viability of entire cropping system, it was revealed that the highest net return (Rs. 23163 ha<sup>-1</sup>) as well as benefit : cost ratio (3.07) was recorded in the treatment where long duration rice variety, Moti was grown as preceding crop. The increased net return was due to better performance of the rice variety, Moti during the wet season though the seed yield of blackgram was significantly less in the same treatment plots. *Utera* cropping with traditionally grown rice variety, Dhusara proved to be less remunerative because of very poor yield of both rice and blackgram from the same treatment plots. Though the treatment of Moti-blackgram *utera* cropping system showed highest net return but the practice of *utera* cropping with late maturing rice variety involves

more risk of crop failure during the particular years receiving low and erratic rainfall specially at late monsoon season (during October) which are more often common (Kurchania *et al.*, 2002).

Thus, it was observed that *utera* cropping of blackgram was equally good with early, medium as well as late maturing rice varieties but success of rice- based *utera* cropping system appears to be much assured by growing suitable *utera* crops (blackgram) with early and medium duration rice varieties of 135-145 days duration like 'Swarna' and 'Pooja' due to efficient use of soil moisture even under early cessation of monsoon.

## REFERENCES

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